



United States Department of the Interior  
UNITED STATES GEOLOGICAL SURVEY  
BIOLOGICAL RESOURCES DIVISION

CALIFORNIA SCIENCE CENTER

Dixon Field Station

6924 Tremont Road

Dixon, California 95620

(916) 756-1946 FAX (916) 678-5039

24 July, 1997



CALFED Bay-Delta Program Office  
1416 Ninth Street, Suite 1155  
Sacramento, CA 95814

Dear sir or madam: — — —

Please accept the enclosed 10 copies of the study proposal entitled "**Waterfowl distribution, movements and habitat use relative to recent habitat changes in the Central Valley of California**" for consideration for funding through the CALFED 1997 Category III Request for Proposals.

This study was identified as the most important migratory bird project that should be completed in California to investigate the impacts of CALFED, the Central Valley Habitat Joint Venture and changing agricultural practices on the ecology of wintering waterfowl. The work will provide information crucial for the management and coordination of these important programs. The concept and design of this project was the result of the cooperative efforts of the managers and researchers in the Pacific Flyway during the Waterfowl Research Needs Workshop held at Sacramento National Wildlife Refuge in 1996. A wide array of waterfowl and wetland experts from private conservation organizations and state and federal resource and research agencies have agreed to serve as the research team to accomplish the project. This project was also cited as the #1 research priority of Pacific Flyway waterfowl coordinators at the First North American Duck Symposium held recently in Baton Rouge, Louisiana. The study proposal has been widely peer-reviewed, and has been called "exceptionally well-conceived" by the Wetland Habitat Coordinator of the California Department of Fish and Game and is strongly endorsed by the Grassland Water District and Central Valley Habitat Joint Venture Management Board (see attached letters).

Additional evidence of local and regional support of the project is the level of in-kind services and funding that partners have pledged thus far to this project. I ask that CALFED consider matching this support with funding at the level of \$215,000 per year for the 3 years of the project.

Please call me if you need any more information. Thank you for your consideration.

Sincerely,

Joseph P. Fleskes

Wildlife Research Biologist/Project Leader



# CENTRAL VALLEY HABITAT JOINT VENTURE

North American Waterfowl Management Plan

May 28, 1997

American  
Farmland Trust  
California Waterfowl  
Association  
Ducks Unlimited  
National Audubon  
Society  
The Nature Conservancy  
The Trust for Public Land

Mr. Joe Fleskes  
U.S. Geological Survey  
Biological Resources Division  
Dixon Field Station  
6924 Tremont Road  
Dixon, CA 95620

Subject: Study Proposal -- "Waterfowl distribution, movements and habitat use relative to recent habitat changes in the Central Valley of California"

Dear Joe:

At the May 19th meeting of the Central Valley Habitat Joint Venture (CVHJV), the Management Board discussed the subject study proposal, which Dave Paullin distributed via mail prior to our meeting. While we are aware that the document we reviewed is still a draft and subject to revision, I am pleased to inform you that the CVHJV Management Board strongly endorses the proposal.

It is our understanding that this proposal was generated following a comprehensive research priority setting meeting, held in Willows, California in February of 1996, and that this specific study was identified as the number one priority out of the 22 research needs that were identified by the 44 biologists in attendance. Clearly, it gets to the heart of the issues and questions that we have been grappling with over the past few years regarding the rapidly changing Central Valley landscape, and how waterfowl are responding to those changes.

At the CVHJV meeting, our discussions focused on three points which I would like to share with you. First, we believe it necessary for the Biological Resources Division (BRD) to make a concerted effort to garner a substantive commitment to internally provide initial funding for this effort. Such an obligation on the part of your agency would considerably bolster the interest of partners who will ultimately be approached for cost-sharing. While the \$50,000 seed money that BRD has committed thus far is laudable as a first step, we believe that the agency must make a larger initial financial commitment, especially in view of the \$750,000 total study cost.

Secondly, the Management Board feels strongly that you and your cooperators need to be particularly sensitive about the impacts your study will have on staff at key state, federal, and private wildlife areas throughout the Central Valley. There is no doubt that the proposed study is the largest and most comprehensive study of its kind ever conducted in the Valley, and we are concerned that such an effort could overwhelm the limited management personnel at these areas -- particularly in their ability to provide the logistical support that you and your field crews will need. We also want to caution you not to be too dependent upon U.S. Fish and Wildlife Service and California Department of Fish and Game personnel to carry out the key elements of the study. If a major disease outbreak, flood, or other unexpected event should occur, it may result in key biologists being pulled off your study to address these emergency situations -- leaving you short-handed.

Finally, we are concerned about the impact of ground crews on birds, particularly in regard to disturbance in sanctuaries. This, of course, is not a new concern, and I am sure you and your crews will do whatever is necessary to minimize disturbance.

In closing, we want to thank you for generating this much needed proposal. The Central Valley Habitat Joint Venture is pleased to see BRD interested in addressing this critical need, and to offer our strong support. Once the proposal is finalized, we will do what we can to help garner the funding and broad support you will need to successfully complete this study. In the meantime, if I can be of any further assistance, please feel free to give me a call at (916) 648-1406.

Sincerely,



Bill Gaines, Chairman  
Central Valley Habitat Joint Venture

cc: Anne Kinsinger  
Jacqueline Schafer  
Don Voros  
Brad Bortner  
Terry Mansfield  
Members, CVHJV Management Board  
Keith Rubin



## Grassland Water District

22759 S. Mercey Springs Road  
Los Banos, CA 93635  
Telephone (209) 826-5188  
Fax (209) 826-4984

July 1, 1997

Dr. Scott Hatch  
California Science Center  
Biological Research Division - USGS  
Chem Annex, Rm. 1480  
University of California  
Davis, CA 95616

Dear Dr. Hatch:

The Grassland Water District (GWD) recently received a copy of the proposed study "Waterfowl distribution, movements and habitat use relative to recent habitat changes in the Central Valley of California." After reviewing the proposal, the GWD would like to offer strong support for the project.

The proposed study will provide greatly needed information necessary to assess changing habitat conditions in the Central Valley. The GWD believes it is crucial for resource managers and conservationists alike to have information on wintering waterfowl distributions. Information of this nature is needed to understand how waterfowl have responded to conservation efforts and agricultural changes throughout the landscape. Furthermore, the data generated by the study will assist resource managers in making adaptive management decisions critical to maintaining healthy ecosystems that wintering waterfowl depend upon for continued survival.

As managed wetlands become increasingly more essential in meeting the needs of wintering waterfowl, it is important to determine the significance of a secure water supply for wetland management and maintenance purposes. Results from a project of this magnitude will be useful to the GWD in supporting the need for a stable water supply to wetlands in the region.

In closing, it is pleasing to see the Biological Resource Division leading the way in developing research to address questions of regional concern. The effort undertaken by the California Science Center to gather support for the project is commendable and the GWD urges the Center to continue and expand its efforts. If the GWD can be of any assistance in encouraging additional support for the project please notify us at (209)826-5188.

Sincerely,

Dean Kwasny  
GWD Biologist

## DEPARTMENT OF FISH AND GAME

1416 NINTH STREET

P.O. BOX 944209

SACRAMENTO, CA 94244-2090  
(916) 653-5284

April 14, 1997

Mr. Stephen Veirs, Jr.  
U.S. Geological Survey  
Biological Resources Division  
California Science Center  
Chemistry Annex, Room 1480  
University of California  
Davis, California 95616

04-18-97 ACS:7 OUT

Dear Mr. Veirs:

Thank you for the opportunity to comment on the study plan entitled *Waterfowl Distribution, Habitat Use and Survival Relative to Recent Habitat Changes in the Central Valley of California* prepared by Mr. Joe Fleskes. My supervisor, Mr. Glenn Rollins, Department of Fish and Game's Wetland Habitat Coordinator, and I thoroughly reviewed the study plan and found the project to be exceptionally well conceived.

We are pleased to see that the study plan has been modified from earlier versions, as we suggested to Mr. Fleskes, to clearly address the issue of waterfowl distribution in relation to the recent development of additional habitats and sanctuaries. It seems very obvious to us that the Central Valley waterfowl habitat landscape has changed substantially in the last 10 years. These changes appear to have had an effect on waterfowl distribution and possibly hunting success. However, a study of this magnitude is needed to determine to what degree waterfowl and waterfowl hunters have been affected, and the actions that will be needed in the future to continue to preserve and enhance wintering waterfowl habitat while ensuring reasonable waterfowl hunting success, particularly on private wetlands. Beyond the issue of waterfowl distribution and hunting success, we feel that this study will answer a wide range of questions concerning wintering waterfowl ecology and habitat management in the Central Valley.

The study plan is very clear and detailed, thus we have only the following general comments:

1. We fully endorse the concept of combining radio-telemetry with systematic aerial waterfowl surveys to determine waterfowl distribution and habitat use patterns. We believe that biweekly waterfowl surveys are an excellent tool for monitoring broad waterfowl population shifts within the Central Valley during winter.

Perhaps this study will serve as the impetus for resuming systematic valley-wide surveys. However, we also believe that the proposed large-scale telemetry work will provide a level of precision not available in the biweekly surveys and that the telemetry portion of the project, therefore, will provide valuable information concerning waterfowl movements in response to hunting pressure, weather, and the emergence on new food sources. Also, daily movements of waterfowl between daytime roosts and nocturnal foraging areas will be of particular interest. Diurnal ~~waterfowl~~ surveys alone would not detect these movement patterns nor would they necessarily document the interchange of individual birds between Central Valley Habitat Joint Venture drainage basins on a daily or weekly basis.

2. Having been recently involved in a Central Valley Project Improvement Act GIS wetland mapping project, we cannot overstate the importance of utilizing numerous sources of information when quantifying habitat types available to waterfowl throughout the Central Valley. Satellite imagery is an excellent tool, but caution should be exercised when interpreting habitat data due to the lack of separation between wintering waterfowl habitats. For example, a saturated or slightly puddled fallow field may be classified as a palustrine emergent wetland, much the same as a swamp timothy-dominated seasonal wetland. Likewise, a saturated ricefield will probably be classified the same as a ricefield flooded six inches deep even though the habitat values of the two fields are very different. With a study of this magnitude, it will undoubtedly be tempting to rely on landscape level habitat data (i.e., satellite imagery) instead of the more traditional forms of habitat classification such as aerial photos, current land use records, and ground verifications. Perhaps the utilization of numerous types of habitat data, both technologically advanced and labor intensive, will result in the most complete data set. I recognize the difficulty in addressing relatively subtle habitat differences, but nevertheless urge Mr. Fleskes and his research crew to pursue every possible means of gathering the most accurate waterfowl habitat data.

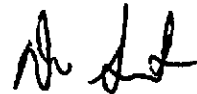
Aside from these two general comments, we offer only the following editorial changes to the study plan:

- Page 2, paragraph 3, sentence 3 - insert "of" between "ecology" and "waterfowl".
- Page 3, paragraph 2, sentence 1 - insert "California Wildlife Conservation Board" after "California Department of Fish and Game,".

Mr. Stephen Veirs, Jr.  
April 14, 1997  
Page 3

Thank you, Stephen, for the opportunity to comment on this extremely important project.

Sincerely,



Dave Smith  
Wetland Biologist

cc: Mr. Glenn Rollins  
Department of Fish and Game  
Sacramento, California

OWN "WATERFOWL" T. EXECUTIVE SUMMARY

97 JUL 28 PM 15

**a. Title:** WATERFOWL DISTRIBUTION, MOVEMENTS AND HABITAT USE RELATIVE TO RECENT HABITAT CHANGES IN THE CENTRAL VALLEY OF CALIFORNIA

**Applicant:** Joseph P. Fleskes

**b. Project Description/Objectives:** This is a cooperative landscape-scale project to investigate impacts of CALFED and other habitat conservation programs such as the Central Valley Habitat Joint Venture (CVHJV) on the ecology of waterfowl wintering in the Central Valley of California. The Central Valley, comprised of the Bay-Delta and Sacramento and San Joaquin Valleys, is one of the most important waterfowl wintering areas in the world. As we enter into a new millennium, we need to understand how waterfowl are responding to these habitat programs so they can be coordinated and managed for optimum benefit of the waterfowl resource and those who enjoy it. This study will measure landscape scale impacts of recent and ongoing habitat changes on wintering waterfowl ecology by comparing waterfowl distribution, movements, and habitat use from before, during and after habitats are restored during CALFED and the CVHJV.

**c. Approach:** Information is available on distribution, movements, and habitat use of waterfowl in California from before the CALFED and CVHJV programs. These data were collected during aerial waterfowl surveys conducted by the USFWS and California Department of Fish and Game (USFWS 1978, USFWS unpubl. data), and during studies of radio-tagged northern pintails (Miller et al. 1993, Miller et al. 1995, Fleskes et al. 1997), mallards (Heitmeyer 1989b, Day et al. 1990) and white-fronted geese (Takekawa et al. 1990) led by the Dixon Field Station of the USFWS (now U. S. Geological Survey) and by the California Waterfowl Association. This study will collect similar data under today's conditions and compare results with those earlier studies to measure the impacts of habitat changes on the ecology of waterfowl wintering in the California. These data can then be related to changing habitat conditions and used to help guide CALFED and CVHJV programs that are so crucial to maintain a healthy waterfowl resource.

**Task 1.** *Assess any changes in wintering waterfowl distribution in the Central Valley.* We will conduct nine complete aerial waterfowl surveys of the Central Valley between September - March during both field seasons and compare waterfowl distribution with that during 1973-79, when periodic aerial surveys of the entire Central Valley were last conducted. We will match the timing of our aerial surveys with the 1970 surveys to facilitate comparisons.

**Task 2.** *Identify any changes in wintering northern pintail, mallard and white-fronted goose distribution, movement patterns and habitat use.* We will track the daily movements and use of feeding and roosting sites of radio-tagged white-fronted geese, mallards, and northern pintails during August-April, each year. We will replicate field methods of earlier studies, (Heitmeyer 1989b, Day et al. 1990, Miller et al. 1993, 1995, Fleskes et al. 1997, J. Takekawa pers. comm.) including timing and locations of radio-tagging and tracking schedules to facilitate comparisons.

**Task 3.** *Evaluate habitat programs of CALFED and the CVHJV and recommend changes if appropriate.* We will map habitat and changes that have occurred during the last decade and use our estimates of the timing and magnitude of waterfowl use in Central Valley basins, the locations of feeding and roost sites, daily and seasonal movement patterns, and use rates of wetland and agricultural habitats to determine habitat requirements for fall, early winter, late winter, spring and evaluate the adequacy of CALFED and CVHJV habitat programs.



**Schedule:** The study will begin in March 1998 and last three years, including two August to April field seasons, a period before the first field season to compile and analyze existing survey, telemetry and habitat data, and a period after the last field season to analyze and report results.

**d. Justification for Project and Funding by CALFED:** Despite loss of over 90% of California's wetlands since the turn of the century, about 60% of Pacific Flyway and 18% of North American waterfowl winter in the Bay-Delta and other Central Valley regions; millions more migrate through or nest there (U.S. Fish and Wildlife Service [USFWS] 1978, Gilmer et al. 1982, Canadian Wildlife Service and USFWS 1986). The amount, distribution and quality of waterfowl habitat in the Central Valley is changing because of changing agricultural practices and habitat conservation efforts of CALFED, CVHJV and others. Managers need current information on waterfowl distribution, movement patterns and habitat use throughout the wintering period to understand how waterfowl have responded to these habitat changes and to estimate the acreage, distribution and flooding regimes of habitats needed to support waterfowl populations in each Central Valley basin. It is crucial that managers of conservation programs have the information necessary to understand how wildlife respond to landscape scale changes so that their large investments provide the maximum sustained benefit for our natural resources.

**e. Budget Costs and Third Party Impacts:** The amount requested from CALFED to complete this study is \$645,000 (\$215K for 3 years) to match funding acquired and in-kind services pledged from other project partners. Third party impacts include improved implementation of the \$528 million CVHJV program, enhanced coordination of CALFED with CVHJV and other programs (e.g. CVP), reduction of fish and wildlife conflicts, and healthier fish and wildlife populations. This should enhance recreational opportunities that may improve the local economy.

**f. Applicant Qualifications** The project leader (Joseph P. Fleskes) has extensive training and over 20 years of working experience researching migratory waterfowl and their habitats throughout North America. He has successfully conducted 3 related projects in California and has assembled a team of waterfowl and wetland experts for this project. In addition to popular articles and management guides, his research has appeared in 12 peer-reviewed publications.

**g. Monitoring and Data Evaluation:** Standard statistical techniques (e.g., analysis of variance, compositional analysis) will be used to analyze data and detect significant results. Data from this study will be integrated with pertinent information from earlier works to generate findings and make recommendations.

**h. Local Support/Coordination/Compatibility:** This study was identified as the #1 research need by private and public managers and researchers during the Waterfowl Research Needs Workshop held at Sacramento NWR in 1996 and by Pacific Flyway waterfowl coordinators at the First North American Duck Symposium held recently in Baton Rouge, Louisiana. The study proposal has been widely reviewed and called "exceptionally well-conceived" by the Wetland Habitat Coordinator of the California Department of Fish and Game and is strongly endorsed by the management boards of the Central Valley Habitat Joint Venture and Grassland Water District (see attached letters). Partners have pledged funds or in-kind services totaling \$645,000.

## II. TITLE PAGE

### **WATERFOWL DISTRIBUTION, MOVEMENTS AND HABITAT USE RELATIVE TO RECENT HABITAT CHANGES IN THE CENTRAL VALLEY OF CALIFORNIA**

**Applicant/Principle Investigator:**

***Joseph P. Fleskes***

*Dixon Field Station-California Science Center*

*Biological Resources Division-U. S. Geological Survey*

*6924 Tremont Road, Dixon, CA 95620*

*tel. (916)756-1946 ext. 628, fax (916)678-5039, joe\_fleskes@usgs.gov*

**Type of Organization and Tax Status:** U. S. Government, tax exempt.

**Tax Identification Number:** 84-1024566

**Technical and Financial Contact person:** Joseph P. Fleskes (see above information)

**Participants/Collaborators in Implementation:**

***Michael Casazza, Dr. David Gilmer, Michael Miller, Dennis Orthmeyer***

*Dixon Field Station-California Science Center*

*Biological Resources Division-U. S. Geological Survey*

*6924 Tremont Road, Dixon, CA 95620*

***Dr. John Y. Takekawa***

*San Francisco Bay Field Station-California Science Center*

*Biological Resources Division-U. S. Geological Survey*

*1408 Mesa Road, P.O. Box 2012, Vallejo, CA 94592*

***Daniel R. Yparraguirre***

*California Department of Fish and Game*

*1416 9th St., #1280, Sacramento, CA 95814*

***Dr. M. Robert McLandress, Gregory Yarris***

*California Waterfowl Association*

*4630 Northgate Blvd., #150, Sacramento, CA 95834*

***David Paullin***

*Central Valley Habitat Joint Venture, U. S. Fish and Wildlife Service*

*2233 Watt Ave., Suite 375, Sacramento, CA 95825-0609*

***Dr. Michael Bias, Dr. Fritz Reid***

*Ducks Unlimited, Inc.*

*3074 Gold Canal Drive, Rancho Cordova, CA 95670*

***Brad Bortner***

*Division of Migratory Birds and Habitat Programs, U. S. Fish and Wildlife Service*

*911 N.E. 11th Ave., Portland, OR 97232-4181*

***Greg Mensik***

*Sacramento National Wildlife Refuge Complex, U. S. Fish and Wildlife Service*

*752 County Road 99W, Willows, CA 95988*

**RFP Project Group Type:** Other Services

### III. PROJECT DESCRIPTION

**a. Project Description and Approach:** CALFED and other habitat conservation programs such as the Central Valley Habitat Joint Venture (CVHJV) are greatly altering the landscape of the Bay-Delta and other Central Valley regions. The Central Valley of California is one of the most important waterfowl wintering areas in the world and managers of these programs need to understand how waterfowl are responding to habitat changes so these programs can be coordinated and managed for optimum benefit of the waterfowl resource and those who enjoy it.

This objective of this study is to measure landscape scale impacts of these conservation programs on wintering waterfowl ecology by comparing waterfowl distribution, movements and habitat use from before, during and after CALFED, CVHJV and other habitat restoration projects take effect. Information is available on distribution, movements, and habitat use of waterfowl in California from before the CALFED and CVHJV programs. These data were collected during aerial waterfowl surveys conducted by the USFWS and California Department of Fish and Game (USFWS 1978, USFWS unpubl. data), and during studies of radio-tagged northern pintails (Miller et al. 1993, Miller et al. 1995, Fleskes et al. 1997), mallards (Heitmeyer 1989b, Day et al. 1990) and white-fronted geese (Takekawa et al. 1990) led by the Dixon Field Station of the USFWS (now U. S. Geological Survey) and by the California Waterfowl Association. Our approach will be to collect similar data under today's changing conditions and compare results with those earlier studies to measure the impacts of habitat changes on the ecology of waterfowl wintering in the California. These data can then be used to guide and coordinate the CALFED and CVHJV programs that are so crucial to maintain a healthy waterfowl resource. Specific tasks and methods to accomplish each are as follows:

**Task 1.** *Assess any changes in wintering waterfowl distribution in the Central Valley.* We will conduct nine complete aerial waterfowl surveys of the Central Valley between September - March during both field seasons and compare waterfowl distribution with that during 1973-79, when periodic aerial surveys of the entire Central Valley were last conducted. We will match the timing of our aerial surveys with the 1970 surveys to facilitate comparisons.

**Task 2..** *Identify any changes in wintering northern pintail, mallard and white-fronted goose movement patterns and habitat use.* We will track the daily movements and use of feeding and roosting sites of radio-tagged white-fronted geese, mallards, and northern pintails during August-April, each year. We will replicate field methodology of earlier studies, including dates and locations of radio-tagging, and day and night tracking (Heitmeyer 1989b, Day et al. 1990, Miller et al. 1993, 1995, Fleskes et al. 1997, J. Takekawa pers. comm.) to facilitate comparisons. Thus, each fall we will capture and radio-tag 300 birds; 60 white-fronted geese in the Klamath Basin or Sacramento Valley, 60 mallards in the Sacramento Valley, and 60 northern pintails each in the Sacramento Valley, Suisun Marsh and San Joaquin Valley. We will radio-tag only adult females. This cohort is especially important to population dynamics and shares similar movement patterns and habitat use with hatch-year birds (Heitmeyer 1989b, Day et al. 1990, Miller

et al. 1993, Miller et al. 1995, Fleskes et al. 1997, J. Takekawa, pers. comm.). Focusing on adults will provide the maximum comparative data at the lowest cost. We will compare local and regional movement patterns and locations of feeding and roosting sites with patterns and sites identified during earlier studies.

**Task 3.** *Evaluate habitat programs of CALFED and the CVHJV and recommend changes if appropriate.* We will map habitat and changes that have occurred during the last decade and use our estimates of the timing and magnitude of waterfowl use in Central Valley basins, the locations of feeding and roost sites, daily and seasonal movement patterns, and use rates of wetland and agricultural habitats to determine habitat requirements for fall, early winter, late winter, spring and evaluate the adequacy of CALFED and CVHJV habitat programs.

**b. Location and/or geographic boundaries of project:** This landscape-scale project will investigate impacts to waterfowl ecology of CALFED projects throughout the entire geographic scope of the CALFED program but especially in Bay-Delta and other Central Valley counties, basins and watersheds. Waterfowl will be radio-tagged in several locations in the Suisun Marsh, San Joaquin Valley and Sacramento Valley and tracked and surveyed throughout California.

**c. Expected benefits:** Results of the project will be made available in reports and publications that can be used by CALFED and CVHJV management board and planning committees, resource agencies, and private managers to design and manage waterfowl habitat projects, especially in the Central Valley of California. Project data will help managers determine whether habitat goals and management strategies of their programs need to be modified to ensure long-term viability of their programs and wildlife populations they support. Results will be published in scientific journals and research information bulletins and presented at technical seminars and workshops. Results will be made available to technical committees of CALFED and the Central Valley Habitat Joint Venture to permit evaluation of and to guide implementation.

**d. BACKGROUND AND JUSTIFICATION:** Despite loss of over 90% of its wetlands since the turn of the century, the Central Valley of California remains one of the most important wintering, migration and breeding areas in North America for waterfowl and other migratory birds (USFWS 1978, Gilmer et al. 1982). Adequate habitat in the Central Valley is essential to maintain healthy waterfowl populations because poor or crowded conditions increase losses to disease, predators and other factors and waterfowl rely heavily on nutrient reserves acquired on wintering and migrational areas to reproduce (Krapu 1974, Heitmeyer and Fredrickson 1981, Anderson and Batt 1983, Raveling and Heitmeyer 1989). Because of its critical importance to North American waterfowl and other wetland wildlife, the Bay-Delta and other Central Valley regions have become a focal point for wetland and habitat conservation efforts.

Two of the most encompassing conservation efforts are CALFED and the Central Valley Habitat Joint Venture (CVHJV). The CVHJV was began in 1988 under the auspices of the North American Waterfowl Management Plan (NAWMP) to restore and enhance wetland habitats and increase the carrying capacity of the Central Valley for waterfowl while maintaining their traditional distribution throughout the valley (Canadian Wildlife Service and U. S. Fish and

Wildlife Service 1986, CVHJV Implementation Board 1990). CALFED's mission is to restore the ecological health and improve water management for beneficial uses of the Bay-Delta system. Each program has the potential to greatly benefit California's fish and wildlife resources. Coordination of the two programs will greatly increase the likelihood that each program succeeds in its respective mission.

Efforts of the CVHJV, U.S. Fish and Wildlife Service, California Department of Fish and Game, California Wildlife Conservation Board and private conservation groups such as Ducks Unlimited, California Waterfowl Association and The Nature Conservancy have resulted in significant habitat development and improvements in the Central Valley during the last decade. Habitat improvements include establishment of new state Wildlife Areas (WAs) and National Wildlife Refuges (NWR), restoration of private wetlands, and enhancement of agricultural lands for wildlife. Total managed wetland acreage in the Central Valley has increased from 115,228 acres in 1985 to 138,882 acres in 1995 (CVHJV Technical Committee 1996). When fully implemented, the CVHJV alone will affect activities on 950,000 acres of wetlands and agricultural lands in the Central Valley at a capital cost of more than \$528 million and an annual cost of about \$38 million (CVHJV Implementation Plan 1990).

CALFED habitat restoration efforts are just beginning. Although many will be focused on fisheries restoration, most projects have potential impacts to waterfowl ecology. For instance, dry and shallow-flooded agricultural lands in the Delta are critical habitats for wintering waterfowl. Changes in flooding regimes of these habitats may alter the ecology of a large portion of state's waterfowl as they move in and out of the Delta in their travels between the Sacramento and San Joaquin Valleys.

In addition to CALFED and the CVHJV, recent changes in agricultural practices have also impacted the quantity, quality and distribution of waterfowl habitat in the Central Valley. Most significantly, flooding for rice-straw decomposition due to restrictions placed on burning, has increased the availability of waterfowl sanctuaries and feeding sites in the Sacramento Valley during the last decade. Overall, acreage of rice flooded after harvest in the Sacramento Valley has increased from about 60,000 acres in 1985 to about 150,000 acres in 1995, with about 6,000 of these acres serving as waterfowl sanctuaries in 1985 because of no or light hunting pressure compared to about 40,000 acres serving as sanctuary in 1995 (CVHJV Technical Committee 1996). In contrast, other expanding farming practices, such as use of the highly efficient "stripper-head" rice harvester and the recent expansion of cotton agriculture into the Sacramento Valley, is reducing the quality and quantity of waterfowl habitat in the Sacramento Valley.

The impact of these recent landscape changes on waterfowl distribution, movements and habitat use is unknown, yet this information is necessary to wisely manage waterfowl resources and habitat programs such as CALFED and the CVHJV (CVHJV Technical Committee 1996). For instance, CVHJV habitat goals were developed to increase the carrying capacity of the Central Valley habitats but maintain the historical (i.e. 1973-1977) distribution of waterfowl throughout the valley (CVHJV Implementation Plan 1990). Changes in regional waterfowl distribution, local movements and harvest opportunities may occur as a result of habitat conservation efforts and changing agricultural practices. About 75% of wetlands in the Central Valley are privately owned (Gilmer et al. 1982, Heitmeyer et al. 1989) and changes in waterfowl distribution and movements may reduce the ability of landowners to raise revenues to support management of these wetlands. Understanding the impacts of habitat changes on waterfowl

ecology would allow the opportunity to coordinate habitat restoration efforts and ensure habitat requirements of waterfowl populations are met throughout the Bay-Delta and other Central Valley basins.

Three types of waterfowl ecology information are needed to estimate the amount, types and locations of wetland and agricultural habitat necessary to support waterfowl populations in each basin: a) waterfowl use-days in each basin, b) daily food (energy) requirements for individual waterfowl, and c) amount of food (energy) acquired by waterfowl in wetland and agricultural habitats (Heitmeyer 1989a).

Current estimates of waterfowl use-days assume waterfowl distribution is like that observed during 1973-77 midwinter surveys, and that use in each basin follows a linear function of gradual buildup in fall, peaking at the midwinter count in early January and gradual declining to desired summer breeding levels (Heitmeyer 1989a). However, studies of northern pintail movements in the Central Valley indicate that the abundance of waterfowl may vary dramatically among basins during the wintering period and peak use in some basins (e.g. San Joaquin) may occur before or after the midwinter survey (Fleskes et al. 1997). Thus, a population model based solely upon the mid-winter survey most likely poorly represents the magnitude and timing of waterfowl use during the wintering period for some basins. Data on waterfowl distribution and movements throughout the wintering period are needed to better estimate waterfowl use days in each basin during the winter in order to determine how much habitat is required and when that habitat needs to be made available (i.e. flooded, etc.) in each basin.

A general estimate of the amount of food required by individual waterfowl can be calculated by assuming energetic expenditure equals 3 times basal metabolic requirements (Heitmeyer 1989a). However, flight is energetically costly compared to other activities, having been estimated to require up to 15 times the basal metabolic requirement (King 1974, Prince 1979). Changes in flight durations related to changes in the quantity and juxtaposition of roost and feeding sites would have a large impact on energy budgets, and should be included in energetic requirement calculations. Data on flight distances and durations under current and changing habitat conditions are needed to supplement existing data on time-energy budgets and improve estimates of energy expenditures and the amount of habitat required to support waterfowl populations in the Bay-Delta and other Central Valley basins.

The amount of energy acquired by waterfowl in wetlands and agricultural fields, requires estimates for the caloric value of waterfowl foods, the amount of waterfowl food produced by wetlands and agricultural lands, and rates of use of these habitats by waterfowl. Information on caloric value and habitat productivity are available in the literature but with a changing mix of habitat types, current use rates are needed. Because most waterfowl feed nocturnally, radio-telemetry methods must be used.

In summary, waterfowl distribution, movements and habitat use before, during and after habitat changes occur needs to be compared to evaluate impacts of these changes and guide and coordinate CALFED, CVHJV and other habitat conservation efforts. We propose to collect data necessary to make these critical measurements and comparisons by conducting periodic winter surveys of all waterfowl species in the Central Valley, using radiotelemetry to study the winter ecology of three important waterfowl species (northern pintails [*Anas acuta*], mallards [*A. platyrhynchos*], and white-fronted geese [*Anser albifrons frontalis*]) for which radio-telemetry data from before recent habitat changes are available, and comparing results with earlier data.

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**e. Proposed Scope of Work:** This project will be accomplished in 3 phases. In phase I (March-July 1998) existing waterfowl survey, radio-telemetry, and habitat data will be compiled, analyzed and formatted for later comparisons. In phase II (August 1998-April 2000) during two, August-April field seasons, habitat conditions will be monitored and waterfowl distribution, movements and habitat use will be studied using aerial surveys and radio-telemetry. During phase III (May 2000-March 2001), data from these two, 9-month field seasons will be analyzed and compared with results from the earlier studies. Progress reports summarizing expenditures and significant results and accomplishments will be submitted at the end of each phase and a final report will be submitted at the end of the project.

**f. Monitoring and Data Evaluation:** Standard parametric and nonparametric statistical techniques (e.g., analysis of variance, compositional analysis) will be used to analyze data and test for significant results. Data from this study will be integrated with pertinent information from earlier works to generate findings and recommendations. The final results will be submitted to peer-reviewed journal(s) for publication.

**g. Implementability:** The project is fully implementable under the terms of current scientific collecting and banding permits held by the Biological Resources Division of the U. S. Geological Survey, U. S. Fish and Wildlife Service, and California Department of Fish and Game Investigators.



#### IV. COSTS AND SCHEDULE TO IMPLEMENT PROPOSED PROJECT

**a. Budget Costs:** CALFED funding in the amount of **\$645,000 over 3 years (\$215,000/yr)** is needed to match funds and in-kind-services (survey flights and salaries) pledged by USFWS, BRD-USGS, California Department of Fish and Game, California Waterfowl Service and Ducks Unlimited, Inc. It is also possible that the support of CALFED will facilitate the leverage of other partnerships, ultimately reducing the total cost to CALFED. Incremental funding is feasible over the three sequential project years or phases (I-Analysis of existing data, II-Field data collection, III-Analysis/comparison of data sets) but failing to fund any one phase or year would prevent accomplishing tasks and meeting objectives. All three tasks will be undertaken throughout each phase of the project. Because this is a joint venture type project, work will be mostly carried out by the cooperating agencies using in-house resources. Some aerial flights will be contracted through the federal "Office of Aircraft Services" and materials will be purchased following federal General Service Administration policies. The Biological Resources Division-USGS will be responsible for distributing and administering any funds that are granted. Specific costs and funding sources for each task of this \$1,290,000 project are provided in Table 1.

Table 1. Project Cost (dollars) Summary by Phase and Task.

Project Phase and Task <sup>1</sup>	Direct Labor Hours	Direct Salary and Benefits	Overhead Labor (Gen. Admin. and fee)	Service Contracts	Material and Acquisition Contracts	Misc. and other Direct Costs	Total Cost
Phase I Task 1	695	16,000	1,900	0	2,000	1,000	20,900
Phase I Task 2	3,652	84,000	9,000	0	3,000	1,000	97,000
Phase I Task 3	1,991	45,800	5,500	0	21,000	1,000	73,300
Phase II Task 1	5,000	115,000	13,800	43,000	27,000	5,000	203,800
Phase II Task 2	17,937	287,000	34,240	61,000	195,000	107,000	684,240
Phase II Task 3	1,390	32,000	3,840	0	21,000	3,000	59,840
Phase III Task 1	870	20,000	2,400	0	2,000	5,000	29,400
Phase III Task 2	1,740	40,000	4,800	0	2,000	5,000	51,800
Phase III Task 3	2,443	56,000	6,720	0	2,000	5,000	69,720

<sup>1</sup>Funding source for all phases and tasks is half CALFED and half from other partners (USFWS, BRD-USGS, CDFG, California Waterfowl Assoc., Ducks Unlimited, Inc.). There are no O&M costs. **Grand total requested from CALFED is \$645,000 (approx. \$215,000 each of 3 years) .**

**b. Schedule of Milestones**

<b>Start-Complete</b>	<b>Milestone</b>
Phase I	
Mar. 98 - July 98	Compile and analyze existing aerial survey, telemetry and habitat data
Mar. 98 - July 98	Recruit field technicians and purchase equipment and supplies
Phase II	
Aug. 98 - Oct. 98	Capture and radio-tag 300 ducks and geese throughout California
Sept. 98 - Apr. 99	Conduct periodic waterfowl surveys and daily tracking of radio-tagged birds
May 99 - July 99	Compile field data, prepare progress report and prepare for 2nd field season
Aug. 99 - Oct. 99	Capture and radio-tag 300 ducks and geese throughout California
Sept. 99 - Apr. 00	Conduct periodic waterfowl surveys and daily tracking of radio-tagged birds
Phase III	
May 00 - Nov. 00	Compile and analyze survey, telemetry and habitat data
Dec. 00 - Mar. 01	Prepare final report

**c. Third Party Impacts:** Third party impacts include improved implementation of the \$528,000,000 Central Valley Habitat Joint Venture (CVHJV) program, coordination of CALFED with the CVHJV and other conservation programs and healthier waterfowl populations. This should result in enhanced recreational opportunities such as waterfowl hunting and bird watching that may improve the local economy.

## V. APPLICANT QUALIFICATIONS

The applicant (Joseph P. Fleskes) is the project team leader and will be responsible for all phases of the proposed work, including scheduling research activities, approving expenditure of funds, and ensuring timely reporting of results. Working in collaboration as project team members to plan and conduct the project are an array of waterfowl and wetland experts from private conservation organizations and state and federal resource and research agencies. Team members David Paullin (Central Valley Habitat Joint Venture coordinator), Brad Bortner (Pacific Flyway migratory bird coordinator), Dr. M. Robert McLandress (California Waterfowl Association biologist), and Dr. Fritz Reid (Ducks Unlimited, Inc. Biologist) helped plan the project and will continue to serve as project advisors. Dr. David Gilmer (BRD-USGS biologist) will work with Dr. Michael Bias (Ducks Unlimited, Inc. biologist) to collect and interpret historical and current habitat data. Daniel R. Yparrigure (CDFG waterfowl specialist) and Greg Mensik (USFWS refuge biologist) have coordinated and conducted operational waterfowl surveys in California for over a decade and will coordinate and conduct the aerial waterfowl surveys for this project. Dr. John Takekawa, Michael Miller, Dennis Orthmeyer, Michael Casazza (BRD-USGS biologists) and Gregory Yarris (California Waterfowl Association biologist) have, along with the project leader, conducted extensive research on waterfowl ecology using radio-telemetry and will lead or participate in the telemetry aspect of the project for a particular region/species of their expertise.

### **Qualifications of Project Leader: Joseph P. Fleskes**

#### **Educational Background.**

**B.S.** 1980, Fisheries and Wildlife Biology, Iowa State University, Ames, Iowa.

**M.S.** 1986, Wildlife Biology, Iowa State University, Ames, Iowa.

**Ph.D.** 1997 (Projected), Wildlife Science, Oregon State University, Corvallis, Oregon.

**Additional Training.** Covey Leadership Training, July 1996, Santa Cruz, CA; All Terrain Vehicle Training, Dixon, CA, 1994; Waterfowl Measurement and Survival Analysis Techniques, Vallejo, CA, January 1992; Predator Management Techniques, Jamestown, ND, August 1990; Office of Aircraft Services Aviation Safety Training, Sacramento, CA, 1990, 1993; CPR Training, Dixon, CA, 1989; Wildlife Disease Workshop, Sacramento, CA, February 1987; Waterfowl Age/ID, Pacific Flyway Wingbee, Redding, CA February 1987; Trees For Tomorrow Environmental Study Center, Eagle River, WI, August 1975.

#### **Professional Experience.**

*December 1994 to present.* Wildlife Biologist (Research), U. S. Department of Interior, United States Geological Survey, Biological Resources Division, (renamed from National Biological Service) California Science Center, Dixon Field Station, Dixon, CA.

*January 1994 to December 1994.* Graduate Research Assistant, Oregon State University, Department of Fisheries and Wildlife, Corvallis, OR.

*June 1993 to January 1994.* Wildlife Biologist, U. S. Department of Interior, National Biological Service, California Science Center, (renamed from FWS, Northern Prairie Wildlife Research Center, Pacific States Ecology Section) Dixon Field Station, Dixon, CA.

*April 1993 to June 1993.* Graduate Research Assistant, Oregon State University, Department of Fisheries and Wildlife, Corvallis, OR.

*July 1986 to April 1993.* Wildlife Biologist, U. S. Department of Interior, FWS, Northern Prairie Wildlife Research Center, Pacific States Ecology Field Station, Dixon, CA.

*March 1985 to July 1986.* Refuge Manager, U. S. Department of Interior, FWS, Region 3, Union Slough National Wildlife Refuge, Titonka, IA.

*February 1984 to July 1986.* Graduate Research Assistant, Iowa State University, Iowa Cooperative Wildlife Research Unit, Department of Animal Ecology, Ames, IA.

*March 1981 to February 1984.* Biological Technician (Wildlife), U. S. Department of Interior, FWS, Northern Prairie Wildlife Research Center, Jamestown, ND and Patuxent Wildlife Research Centers, Mississippi Field Station, Vicksburg, MS.

*March 1978 to March 1981 (intermittent).* Wildlife Research Technician, Iowa Department of Natural Resources, Drakesville, Chariton, and Clear Lake IA.

*March 1980 to June 1980.* Undergraduate Teaching Assistant, Iowa State University, Department of Animal Ecology, Ames, IA.

#### **Selected Publications of applicant**

- Miller, M.R., **J. P. Fleskes**, D.L. Orthmeyer, W.E. Newton, and D.S. Gilmer. 1995. Survival of adult female northern pintails in Sacramento Valley, California. *J. Wildl. Manage.* 59(3):478-486.
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- story of Union Slough. Pages 275-278 in L. H. Fredrickson, G. V. Burger, S. P. Havera, D. A. Graber, R. E. Kirby, and T. S. Taylor, eds. Proc. 1988 North Am. Wood Duck Symp., St. Louis, Missouri.
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- Gilmer, D.S., J.M. Hicks, **J. P. Fleskes** and D.P. Connelly. 1989. Duck harvest on public hunting areas in California. Calif. Fish and Game 75(3):155-168.
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- Fleskes, J. P.** 1986. Evaluation of waterfowl production at Union Slough National Wildlife Refuge. M.S. Thesis, Iowa State Univ., Ames. 139 pp.
- Sargeant, A.B., S.H. Allen and **J. P. Fleskes**. 1986. Commercial sunflowers: food for red foxes in North Dakota. Prairie Nat. 18(2):91-94.
- Fleskes, J. P.** and J. Clark. 1985. A northern harrier nest in Kossuth County. Iowa Bird Life 55:114-115.

#### **Honors and Awards.**

*Citizen Ambassador Program (Invited).* Wetlands delegation to Australia and New Zealand. February 1996. *Length-of-Service Award (10-yr).* U. S. Department of Interior, Fish and Wildlife Service and National Biological Service. Dixon, CA. August 1993. *Quality Performance Award.* U. S. Department of Interior, FWS, Dixon, CA. September 1992. *Special Achievement Award.* U. S. Department of Interior, FWS, Dixon, CA, November 1988. *Izaak Walton League McNurlen Memorial Scholarship.* Izaak Walton League. Dubuque, IA. August 1985. *Special Contribution Award.* U. S. Dep. Interior, FWS, Northern Prairie Wildlife Research Center. Jamestown, ND. March 1982. *Dean's List.* Iowa State University, Ames, IA. 1978-1980. *Environmental Science Center Selection.* Eagle River, WI. One of ten Iowa High School students selected. 1975.

#### **Professional Society Participation.**

**The Wildlife Society** (Currently-National and Western Section member; Previously, Iowa and North Dakota Chapters, Midwest Section). **Vice President - Sacramento Chapter- The Wildlife Society (1988), Secretary/Treasurer - Sacramento Chapter- The Wildlife Society (1987). Newsletter co-editor - Iowa Chapter - The Wildlife Society (1985-1986).**

#### **References**

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Corvallis, OR 97331-3803	Ames, IA 50011	Los Banos, CA 93635
503-737-1956	515-294-7990	209-826-3508

## **VI. COMPLIANCE WITH STANDARD TERMS AND CONDITIONS**

All terms and conditions stated in the CALFED RFP are agreeable to and able to be complied with by the applicant.